

Soluzione della 2^a Esercitazione Maggio 2014

1) $n_{C_xH_yO_z} = \frac{2,250g}{174,09g/mol} = 0,0129 mol$; $n_C = n_{CO_2} = \frac{4,548g}{44,01g/mol} = 0,1033 mol$

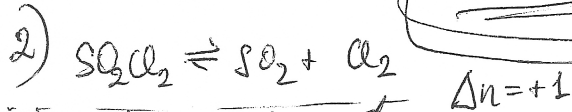
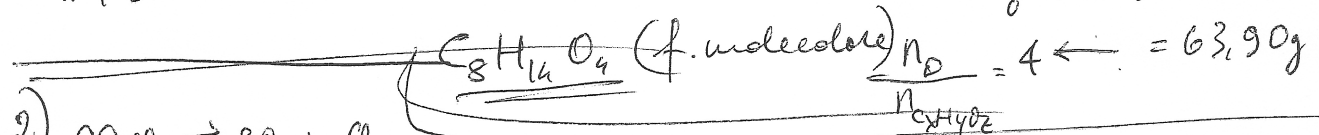
$n_H = 2 \cdot n_{H_2O} = 2 \cdot \frac{1,629g}{18,02g/mol} = 0,1808 mol$

$m_C = 8 \times 12,01 = 95,98g$

$\left(\frac{n_C}{n_{C_xH_yO_z}} = \frac{0,1033}{0,0129} = 8 ; \frac{n_H}{n_{C_xH_yO_z}} = \frac{0,1808}{0,0129} = 14 \right)$

$m_H = 14 \times 1,01 = 14,12g$

$m_O = 174 - (95,98 + 14,12) = 63,90g$



i	1	1	0
eq	1-x	1+x	+x
	(0,806)	(1,194)	(0,194)

$n_{tot} = 2 + x = \frac{PV}{RT} = \frac{5,46 \times 10}{0,0821 \times 303,15} = 2,194 mol$

$x = 0,194$

$x_{SO_2Cl_2} = \frac{0,806}{2,194} = 0,3674$

$x_{SO_2} = \frac{1,194}{2,194} = 0,5442$

$x_{Cl_2} = \frac{0,194}{2,194} = 0,0884$

$K_p = \frac{x_{SO_2} \cdot x_{Cl_2}}{x_{SO_2Cl_2}} \cdot P_{tot} = \frac{0,5442 \cdot 0,0884}{0,3674} \cdot 5,46 = \underline{\underline{0,715}}$

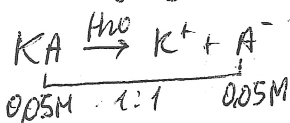
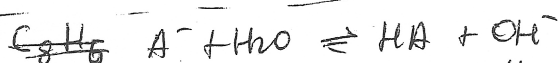
3) $n_{HA} = 0,6l \times 0,2M = 0,12 mol$



$n_{OH^-} = 2 n_{calcolch} = 2 \cdot 0,4 \times 0,1 = 0,08 mol$



Soluzioni tampone con $K_a \gg 10^{-7} \rightarrow [H_3O^+] = K_a \cdot \frac{[HA]}{[A^-]} = 1,1 \cdot 10^{-3} \cdot \frac{4 \cdot 10^{-2}}{8 \cdot 10^{-2}} = 5,5 \cdot 10^{-4} M$



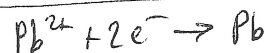
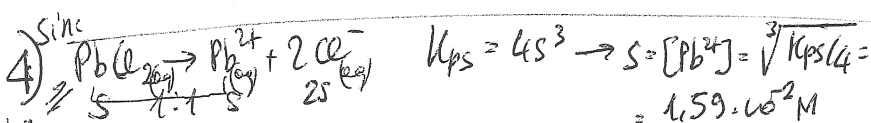
$K_b = \frac{K_w}{K_a} = \frac{10^{-14}}{1,1 \cdot 10^{-3}} = 9,09 \cdot 10^{-12} \ll 10^{-7}$

$pH = \underline{\underline{3,26}}$

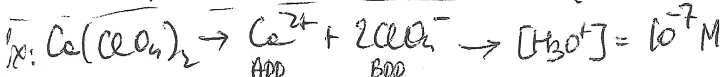
$CK_b = 0,05 \times 9,09 \cdot 10^{-12} = 4,54 \cdot 10^{-13}$

$[OH^-]^2 - K_w - CK_b = 0 \rightarrow [OH^-] = \sqrt{K_w + CK_b} = \sqrt{10^{-14} + 4,54 \cdot 10^{-14}} = 6,81 \cdot 10^{-7} M$

$pOH = 6,17 \rightarrow pH = \underline{\underline{7,83}}$



$E_{Pb^{2+}/Pb} = -0,126 + \frac{0,0592}{2} \log \frac{[Pb^{2+}]}{1} = -0,179 V \oplus$



$E_{H_3O^+/H_2} = 0 + \frac{0,0592}{2} \log \frac{[H_3O^+]^2}{1} = -0,414 V \ominus$

$\Delta E = -0,179 - (-0,414) = 0,235 V$